Listing of Claims

Claims 1-8 (cancelled)

Claim 9 (original) A method for estimating a loop composition of a subscriber loop in terms of loop parameters $X_1, X_2, \ldots, X_i, \ldots, X_N$, the loop having a frequency-domain response $H(\omega, X_1, X_2, \ldots, X_i, \ldots, X_N)$ for the loop parameters, the method comprising the steps of

(a) determining a range for each loop parameter X_i,

(b) for each loop parameter X_i, generating a frequency-domain loop parameter function $F_{X_i}(\omega)$ wherein

$$F_{X_i}(\omega) = \int_{X_1}\int_{X_2}\ldots\int_{X_i}\ldots\int_{X_N} X_i H(\omega, X_1, X_2, \ldots, X_i, \ldots, X_N)\, d X_1 d X_2 \ldots d X_i \ldots d X_N,$$

(c) generating a loop kernel $k(\omega, \beta)$ for all loop parameters wherein

$$k(\omega, \beta) = \int_{X_1}\int_{X_2}\ldots\int_{X_N} H(\omega, X_1, X_2, \ldots, X_N)\; H(\beta, X_1, X_2, \ldots, X_N)\; dX_1 d X_2 \ldots d X_N,$$

(d) generating a parameter response function $g_i(\beta)$ for each loop parameter from the integral relation $F_{X_i}(\omega) = \int_{\beta} k(\omega, \beta)\, g_i(\beta) d\beta$,

(e) energizing the loop from a measurement end with an energy source,

(f) measuring a response signal $H_R(\omega) = H(\omega, X_1, X_2, \ldots, X_i, \ldots, X_N)$ for the loop at the measurement end, and

(g) directly determining each loop parameter X_i from the integral relation

$$X_i = \int_{\beta} H_R(\beta)\, g_i(\beta) d\beta.$$

Claim 10 (original) The method as recited in claim 9 wherein step (e) includes the step of computing the inverse of $k(\omega,\beta)$.

Claim 11 (original) The method as recited in claim 9 wherein step (e) includes the step of computing the inverse of $k(\omega,\beta)$ using singular value decomposition.

Claim 12 (original) The method as recited in claim 11 wherein step (f) includes the step of filtering noise from the response signal.

Claims 13-19 (cancelled)